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A CONTRIBUTION TO THE STUDY OF THE GENUS *CALIDEA* LAPORTE (HEMIPT.-HETEROPT., PENTATOMIDAE)

By Paul Freeman, A.R.C.S., B.Sc.

(Read 19th October, 1938.)

With 31 Figures.

Introduction.

The work here described was undertaken as a result of a report on cotton pest control work in south and central Africa and the Rhodesias (Munro, 1937), in which it is stated (p. 33) that " at least three plant-sucking bugs other than *Dysdercus* species act as vectors of ' boll-rot ' fungi, the Pentatomids, *Nezara viridula* and *Callidea dregii*, and the Capsid, *Helopeltis* species." Harris (1934 : 86 and 1936 : 90) also stressed the importance of *Calidea* species as vectors of " boll-rot," and it is interesting to note that Hardenburg (1922 : 288) came to the same conclusion concerning *C. dregii* in Mozambique.

Identification of these bugs is difficult, hence a study of their systematics is of first-rate importance as a basis for further study and control. This paper is a preliminary account of the species of *Calidea* Laporte based on a study of the collection of the British Museum, and shortly I hope to follow it with an account of the genus *Nezara* Amyot and Serville.

Calidea Laporte.

General Remarks.

The genus *Calidea* Laporte (Pentatomidae, Scutellerinae) is confined to the Ethiopian Region including Madagascar and Arabia. *Calidea* is quite distinct from the other Ethiopian genera of the tribe Scutellerini. It may be separated from these genera by the following characters (see below for fuller descriptions of each character) : the very convex pronotum and head; the elongate form; the strong punctation, and the size of the punctures across the pronotal calli; the deep emargination of the sides of the head; the shape of the metathoracic scent-gland spout and evaporating area; the flat upper surface of the tibiae; the length of the antennae and the comparative lengths of their segments.

Schouteden (1903 : 34–47) gave the most recent account of the genus, but the specific characters used by him and earlier authors are unsatisfactory, and I have separated the species almost entirely on a study of the male genitalia. So far, I have been unable to find satisfactory characters for the separation of the females of all species.

It is possible to divide the genus into two groups on the structure of the male genitalia. Separation of the species of the first group is quite easy, but the second group offers considerable difficulty because of the great variability of the characters usually regarded as specific. The male genitalia provide the only good specific character for this second group, no definite

character having been yet found for the separation of the females. Actually with practice and by examining a series, it is possible to separate most of the species by their general facies, though the male genitalia should always be examined, preferably after boiling in a solution of caustic potash. For this reason I have added a description of other characters, as well as a description of the genitalia of each species, in an attempt to depict the general facies. Determination of a species is rendered more difficult because each occurs in numerous geographical races, each with a special facies of its own. Colour and size are more or less constant for each race but differ from those of other races. The differences between some of the races are considerable, possibly correlated with their distance apart geographically, but, since the male genitalia are of the same form, I have considered them as belonging to the same species.

The material in the collection of the British Museum consists of series collected at various times from a few widely separated localities, mostly situated in British Colonies, and the specimens of each species can be divided into as many markedly different forms. By examining a continuous series collected from all over the area of distribution, it may prove that some of the allied forms now regarded as species are only geographical races. Breeding experiments are essential to determine this point.

I was unable to examine the types except those of *Scutellera humeralis* Walker and *Libyssa purpurascens* Walker which are in the collection of the British Museum. Hence I did not consider it necessary to list the full synonymy for each species, as, owing to the vagueness of the original descriptions, I should have had to copy from already existing lists. Most of the synonymy is given by Stål (1873), Schouteden (1903, 1904), and Kirkaldy (1909). It is, of course, impossible to say how accurate these are until the types have been examined. The specific names used have been derived from these papers, with the following points of difference: *C. distinguenda* Reiche & Fairm. and *C. natalensis* Stål have been joined as one species, *C. distinguenda* Reiche & Fairm.; *C. duodecimpunctata* (Fabr.) has been split into species provisionally named *C. duodecimpunctata* (Fabr.) and *C. nana* Hahn & Herrich-Schäffer; *C. dregii* Germar and *C. humeralis* (Walk.) regarded by Schouteden and Kirkaldy as subspecies of *C. duodecimpunctata* (Fabr.) have been given specific rank; the subspecies *C. apicalis* Schouteden has been found to be a colour variety of *C. dregii* Germar.

Calidea Laporte.

Calidea Laporte de Castelnau (1832) in part, Kirkaldy (1909).
Callidea (emend.) Burmeister (1835) in part, Hahn & Herrich-Schäffer (1835) in part, Germar (1837), Hope Catalogue (1837) in part, Germar (1839) in part, White (1842) in part, Amyot & Serville (1843) in part, Reiche & Fairmaire (1848) in part, Stål (1865), Walker (1868) in part, Stål (1873), Lethierry & Severin (1893), Schouteden (1903, 1904, 1917), Lehmann (1919).
Cimex Fabricius (1794) in part, Panzer (1798) in part, Coquebert (1799), Wolff (1802) in part.
Tetyra Fabricius (1803) in part.
Scutellera Latreille (1807) in part, Palisot de Beauvois (1820) in part, Blanchard (1840) in part, Walker (1867) in part.
Libyssa Dallas (1851 : 21, type *Tetyra signata* (Fabr.) fixed by Kirkaldy 1909 : xxxv), Stål (1853), Signoret (1861), Walker (1867), Vollenhoven (1868, 1869).

Genotype *Calidea signata* (Fabricius, 1794 *nec* 1775) = *C. panaethiopica* Kirkaldy, 1909 (fixed by Kirkaldy, 1901 : 178).

Characters of *Calidea* Laporte.

Form. Elongate, convex above and below. Head and prothorax very convex if viewed laterally, tip of the head held vertically downwards (fig. 1). Hind angles of the prothorax not prominent. *Sculpture.* Very strongly punctured, irregularly but closely

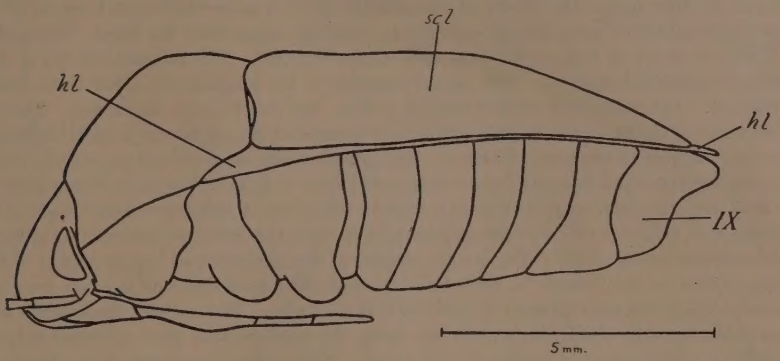

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FIG. 1.—Lateral view of *C. dregii* Germar (male). Main features only, legs and segments 3–5 of antenna omitted. *hl*, hemelytron; *scl*, scutellum; *IX*, ninth abdominal segment.

and deeply, particularly on the thorax. The head is less closely punctured, and there are no punctures along the middle line of the venter. The surface between the punctures is broken up by minute scale-like sculpture. *Head.* The head is usually concolorous with the thorax, but may be darker, and there are usually longitudinal lighter

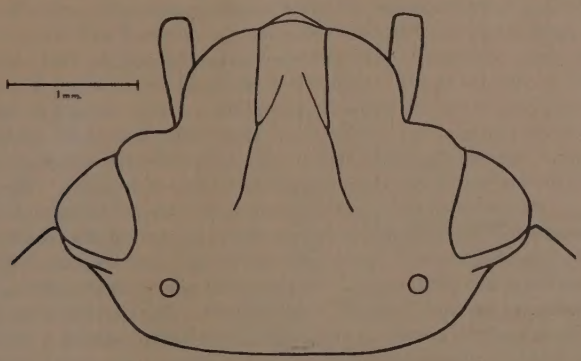

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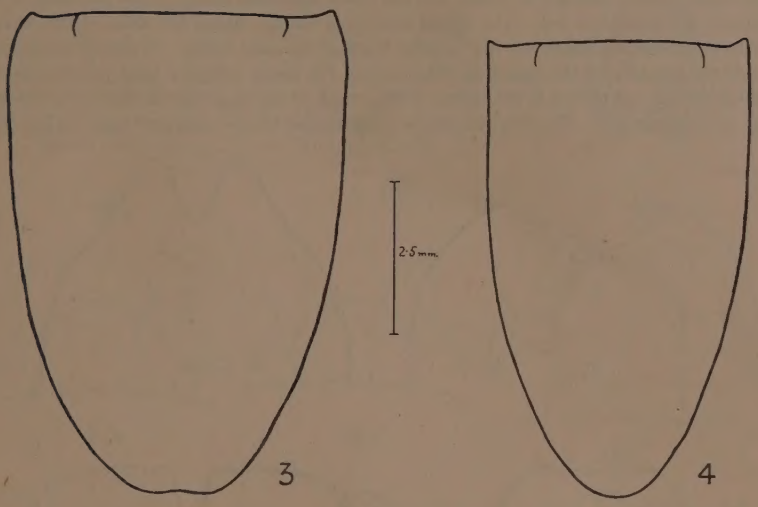
FIG. 2.—Dorsal view of head of *C. dregii* Germar.

coloured stripes which are sometimes reduced to spots or are absent altogether. There is a deep right-angled emargination just in front of the eyes, causing the anterior half of the head to be parallel-sided (fig. 2). The three lobes are of approximately the same length. The length is shorter than the breadth across the eyes. The punctation is not as close as is that of the thorax, and there is often a punctureless area

down the centre. The eyes are medium-sized, and the ocelli are placed just behind a line joining the hind margins of the eyes. The antennae are five-segmented and black, except for the basal segment which is usually partially or completely red. The basal segment is short and reaches to the apex of the head; the second segment is usually shorter than the first but may be subequal to it; the third segment is subequal to the first in *C. distinguenda* but in all other species the third is the longer, though it is never more than twice as long; the fourth and fifth segments are subequal and slightly longer than the third. The whole antenna is about as long as the head and thorax together. The rostrum reaches to the second abdominal segment. The second segment is the longest, the other three being subequal. The rostrum is often partially yellow, but this is very inconstant. *Thorax.* The whole of the thorax is strongly and closely punctured except for the pronotal calli and near the sutures on the ventral surface. The pronotal calli are devoid of punctures except for a transverse band formed of punctures equal in size to those of the surrounding surface. Colour very variable, usually there is a metallic sheen and a number of large black spots arranged as follows: the prothorax bears eight spots in two rows, an anterior one of three and a posterior one of five. The lateral margins of the prothorax are nearly always of the same colour as the venter, *i.e.* red or yellow, and the lateral spots of the two rows are usually fused to form a dark band just inside this margin. The spots of the anterior row are comparatively small, the central one being the smallest and often diamond-shaped, while the lateral ones enclose the pronotal scars. The central three spots of the posterior row are large and oblong, reaching from the hind margin to the middle of the pronotum. Usually, however, the central spots of the two rows are fused to form a median band which is pointed anteriorly. When the outer lateral spots of the posterior row are not fused with the laterals of the anterior row they are small and placed in the hind angles. The scutellum bears six spots in three transverse pairs: the central pair is the largest, and the spots of this pair are usually transverse and often fused across to form a broad band; the spots of the other two pairs are usually subequal and oval. Besides bearing these spots the scutellum is darkened to a variable extent around the margin laterally and posteriorly, and there is a median dark stripe between the spots. The ventral surface of the thorax is dark in colour, and bears a variable amount of lighter colouring, especially around the scent-gland orifice. The light lateral margins of the pronotum are continued well over on to the ventral surface, particularly posteriorly. The pronotum is six-sided and the hind angles are obtuse. The scutellum is truncate apically, except in *C. distinguenda*, in which it is rounded (figs. 3, 4). The scutellum covers the abdomen except for a narrow margin at the sides. The basal halves of the costae of the hemelytra are also visible, and so are the tips, except in *C. distinguenda*. Because the apices of the wings are visible, the scutellum appears to be rounded in all species, but a closer examination shows it to be truncate. The metathoracic scent-gland and its associated spout and evaporating area are not prominent and not raised suddenly from the surrounding surface, but are placed on the top of a rounded ridge which rises smoothly from the pleuron. At its outer end the spout curves posteriorly and round a lateral prominence of the metapleuron. In colour the spout and evaporating area may be yellow or black, and are very variable in this respect. The costal and the hind margins, and the membranes of the hemelytra are clouded dark brown, leaving a central clear area of the corium which is often more or less encroached upon by the apical infuscation. The hind-wings are clouded apically, so that when the wings are spread out there appears to be a continuous dark band across the tips of both fore- and hind-wings. In all species but *C. distinguenda* and *C. hutereauae*, there is a light streak along the base of the costa of each hemelytron. The coxae and femora, and the basal half of each claw, are usually red to a greater or lesser extent, the rest of the legs being black often with a metallic sheen. The tibiae are flattened above, usually with definite ridges demarcating the flattened zone. *Abdomen.* The abdomen is strongly convex at the sides below, and nearly flat in the middle. The punctation is close at the sides and practically absent in the middle line.



FIGS. 3–4.—(3) Outline of scutellum of *C. bohemani* (Stål); (4) the same of *C. distinguenda* Reiche & Fairm.

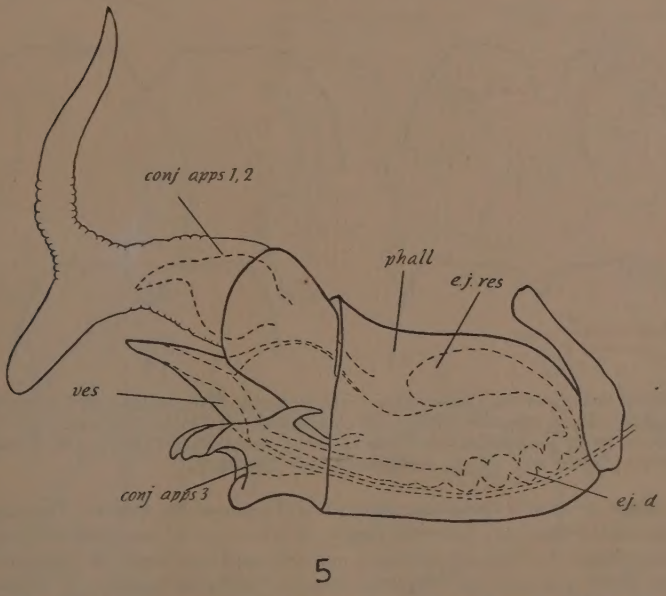
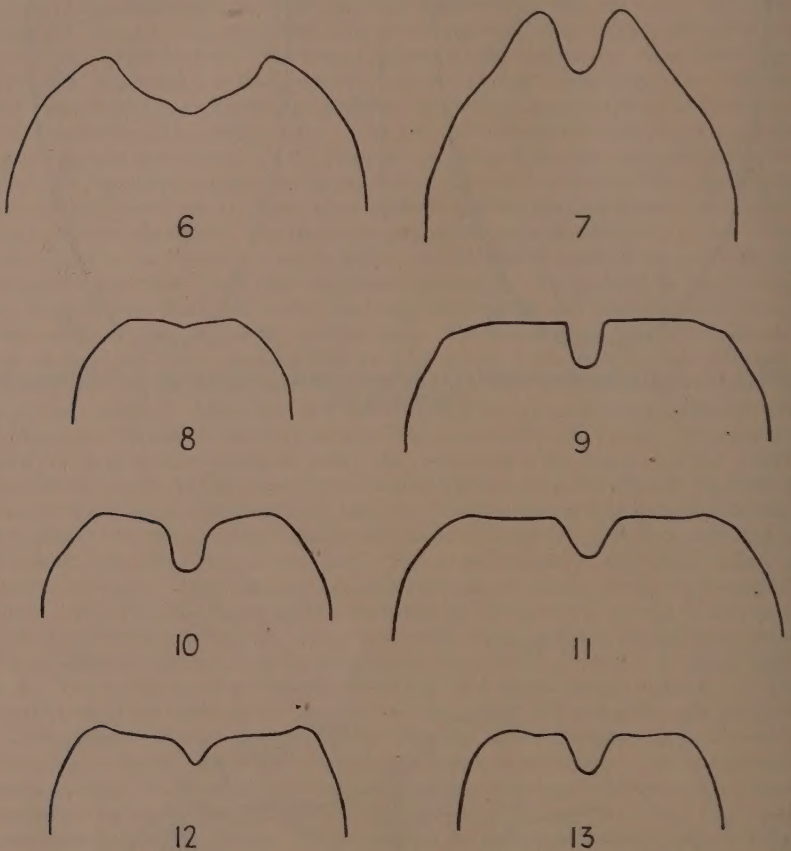


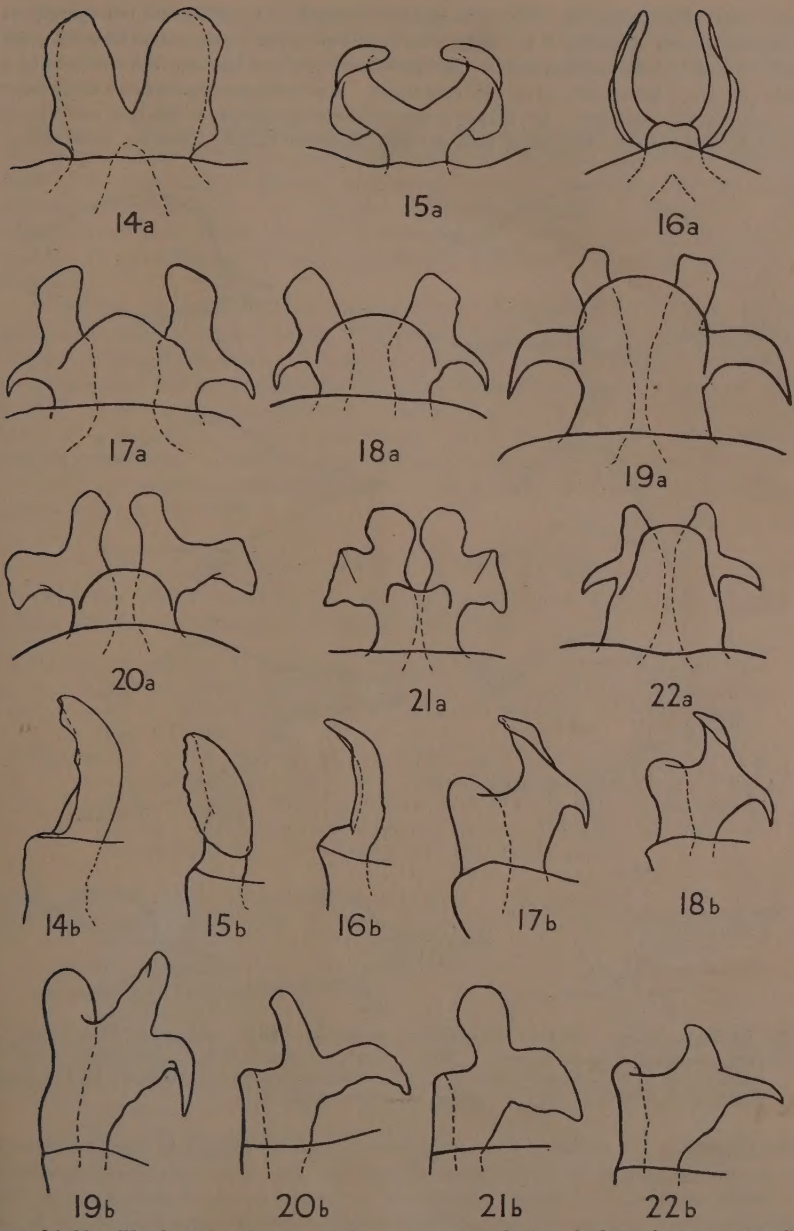
FIG. 5.—Lateral view of aedeagus of *C. dregii* Germar. *conj. apps. 1, 2,* first and second conjunctiva appendages; *conj. apps. 3,* third conjunctiva appendages; *ej. d,* ejaculatory duct; *ej. res,* ejaculatory reservoir; *phall,* phallosoma; *ves,* vesica.

The basal ventral segment is black, and the other segments except those involved in the genitalia are orange or red. The upper surface is black. Along the sides of the venter, one to each segment, there is a row of large black or metallic spots. Typically these spots are placed apically on the segments not touching the upper margin; they just enclose the spiracles which are placed in the centre of the length of the segments on the upper anterior edge of a depression. However, the spots often spread basally and fuse more or less with



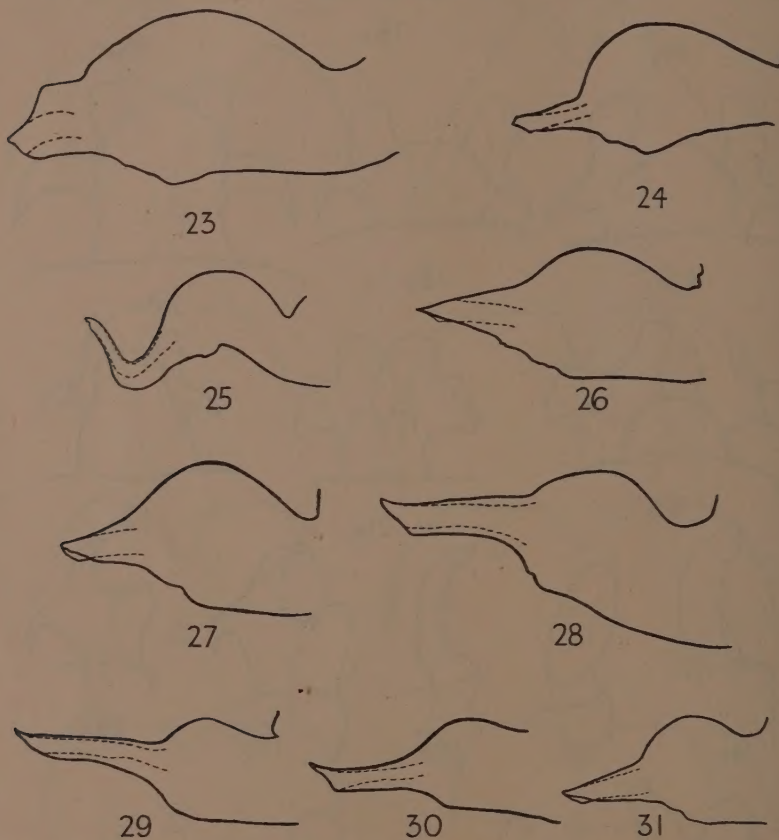
FIGS. 6–13.—Outlines of the apices of the ninth segments of the males. (6) *C. panaethiopica* Kirkaldy; (7) *C. bohemani* (Stål); (8) *C. distinguenda* Reiche & Fairm.; (9) *C. dregii* Germar; (10) *C. hutereauae* Schouteden; (11) *C. humeralis* (Walker); (12) *C. duodecimpunctata* (Fabricius); (13) *C. madagascariensis* (Signoret).

each other, and so form a continuous band along the side of the venter. The upper and lower edges of this band are, however, jagged, showing it to be composed of fused spots. In *C. panaethiopica* the spots are continued upwards until they touch the upper margin of the venter, but they do not fuse completely from the top to the bottom. *C. bohemani* has two rows of spots, the lower one being the normal one enclosing the spiracles, the upper spots being much smaller and placed on the margin of the abdomen. Sometimes in *C. distinguenda* the normal row is split to form two rows, but here the spiracles are on the



FIGS. 14–22.—Third conjunctiva appendages. a, ventral view, b, lateral view. (14) *C. panaethiopica* Kirkaldy; (15) *C. bohemani* (Stål); (16) *C. distinguenda* Reiche & Fairm.; (17) *C. dregii* Germar; (18) *C. hutereauae* Schouteden; (19) *C. humeralis* (Walker); (20) *C. duodecimpunctata* (Fabricius); (21) *C. nana* Hahn & H.-Schäffer; (22) *C. madagascariensis* (Signoret).

upper row. *Male genitalia.* The ninth segment is black or metallic, and red apically in the second group. Apically it is emarginate, the shape of the emargination forming quite a good specific character (figs. 6–13). The parameres are bent apically into the form of a hook, and are of little value as specific characters. The aedeagus (fig. 5) bears three pairs of conjunctiva appendages: the first two are membranous except for the base and tips of the arms, and are very long when evaginated to their full length; they are more or less



FIGS. 23–31.—Vesicae. (23) *C. panaethiopica* Kirkaldy; (24) *C. bohemani* (Stål); (25) *C. distinguenda* Reiche & Fairm.; (26) *C. dregii* Germar; (27) *C. hutereauae* Schouteden; (28) *C. humeralis* (Walker); (29) *C. duodecimpunctata* (Fabricius); (30) *C. nana* Hahn & H.-Schäffer; (31) *C. madagascariensis* (Signoret).

joined together, and owing to their membranous character difficult to describe, hence I have not used them in the separation of the species. The third conjunctiva appendages are completely sclerotised, and they present by far the best specific characters: in the first group they are uniramous and bear a crest running along their length (figs. 14–16), in the second they are forked, one branch being recurved and hook-like (figs. 17–22) whilst the other branch runs backwards, in a manner similar to the whole appendage in the first group. The vesica is bulbous and contracted apically as shown in the figures (figs. 23–31). The

arrangement of the parts and their relation to each other can be seen from figure 5. I have followed the nomenclature used by Pruthi (1925). *Female genitalia.* The female genitalia have little value in this genus either as specific or generic characters, and I have omitted further reference to them.

Group I. Third conjunctiva appendages not forked, and with a crest running along their length, though this is not very distinct in *C. panaethiopica.* Ninth abdominal segment of the male black or metallic, not truncate apically. Spots along the sides of the abdomen may be in one or two rows, and may touch the margin of the abdomen. The species are all quite distinct from each other and are probably not very closely allied. Includes *C. panaethiopica* Kirkaldy, *C. bohemani* (Stål), and *C. distinguenda* Reiche & Fairmaire.

Group II. Third conjunctiva appendages forked, one branch being recurved, the other bearing sometimes a very slight crest. There is a well-marked median lobe at their junction in most species. Ninth abdominal segment of the male always red apically when seen from a ventral aspect, and it is truncate apically with a comparatively small emargination in the centre. There is never more than one row of spots along the side of the abdomen, and these are usually fused to form a broad band. All of the species are closely allied and difficult to separate. Includes *C. dregii* Germar, *C. hutereauae* Schouteden, *C. humeralis* (Walker), *C. duodecimpunctata* (Fabricius), *C. nana* Hahn & Herrich-Schäffer, and *C. madagascariensis* (Signoret).

Key to the species of *Calidea* Laporte.

(This key may be used for the identification of males of all species described below, but for the females of the first group only.)

1 (6). Ninth segment of the male ventrally black, not truncate; third conjunctiva appendages not forked. Abdominal spots in one or two rows one of which touches the margin, or else the apex of the scutellum is rounded (first group).

2 (3). Largest species in the genus, 17–20 mm. long. First and second antennal segments subequal. Abdominal spots reaching the margin of the venter. Ninth segment of the male widely emarginate (fig. 6). Third conjunctiva appendages short and broad, crest not very obvious (fig. 14). Vesica apex short and broad
panaethiopica Kirkaldy.

3 (2). Smaller species without these characters.

4 (5). Medium-sized, broader species. Third antennal segment longer than the first, but of about the same breadth. Two rows of spots along the venter, the upper ones being placed on the margin, and the lower ones enclosing the spiracles. Ninth segment of the male apically contracted, with a deep emargination (fig. 7). Third conjunctiva appendages curved strongly inwardly and downwardly (fig. 15). Apex of vesica small (fig. 24) . . . . . *bohemani* (Stål).

5 (4). Small species, abdomen rather strongly contracted apically. Third antennal segment either slightly shorter than, or subequal to, the first, but one and a half times as thick. Usually only one row of spots along the side of the venter, or these may be split, in which case the spiracles are always in the upper row and the spots never touch the margin of the venter. Ninth segment of the male widely and shallowly emarginate (fig. 8). Third conjunctiva appendages long and narrow (fig. 16), not curved as in *C. bohemani.* Vesica apex long, narrow, and strongly bent upwards (fig. 25)
distinguenda (Reiche & Fairmaire).

6 (1). Ninth segment of the male ventrally distally red, truncate; third conjunctiva appendages forked. Abdominal spots in one row never touching the margin, apex of the scutellum always truncate (second group).

7(12). Upper branches of the third conjunctiva appendages strongly recurved and sharply pointed (figs. 17–19). Emargination of the ninth segment of the male deep, though V-shaped in *C. humeralis*.

8 (9). Emargination of the ninth segment of the male broad and V-shaped (fig. 11). Upper branches of the third conjunctiva appendages strongly recurved and usually larger than the lower branches (fig. 19). Vesica apex long and parallel-sided (fig. 28). Medium-sized, broad, blue-black or purple species. Thoracic spots absent or indistinct. Light margin of the prothorax broader than in any other species *humeralis* (Walker).

9 (8). Emargination of the ninth segment of the male deep and U-shaped. Upper branches of the third conjunctiva appendages smaller than the lower ones, median lobe smaller than in *C. humeralis*. Apex of the vesica conical. Not unicolorous purple, spots usually distinct.

10(11). Emargination of the ninth segment of the male smaller, its limits rectangular (fig. 9). Upper branches of the third conjunctiva appendages broader basally, and the lower branches not divergent in ventral view (fig. 17). Vesica not strongly swollen, apex longer (fig. 26). Lateral margins of the prothorax always concolorous with the venter, though not as broadly so as in *C. humeralis*. Medium-sized narrow species . . . . . *dregii* Germar.

11(10). Emargination of the ninth segment of the male larger and relatively broader, its limits rounded (fig. 10). Upper branches of the third conjunctiva appendages narrow basally, and the lower branches divergent in ventral view (fig. 18). Vesica more swollen, apex shorter (fig. 27). Lateral margins of the prothorax dark, or, if concolorous with the venter, only narrowly so. Medium-sized to rather small species of a deep blue colour and squat in form . *hutereauae* Schouteden.

12 (7). Upper branches of the third conjunctiva appendages broad, not strongly recurved and usually bluntly pointed (figs. 20–22). Emargination of the ninth segment of the male V-shaped (figs. 12, 13).

13(16). Emargination of the ninth segment of the male shallow (fig. 12). Upper branches of the third conjunctiva appendages broad and not sharply pointed, lower branches more or less capitate and convergent in ventral view. The base of each appendage narrower (figs. 20, 21). Vesica less swollen, apex long and parallel-sided (figs. 29, 30). Basal segment of each antenna usually red, partly at least. Femora not widely black apically. Species not from Madagascar.

14(15). Upper branches of the third conjunctiva appendages narrower; lower branches less capitate, not closely apposed in ventral view (fig. 20). Vesica apex longer (fig. 29). Larger species . *duodecimpunctata* (Fabr.).

15(14). Upper branches of the third conjunctiva appendages usually broader; lower branches more capitate, closely apposed in ventral view (fig. 21). Vesica apex shorter (fig. 30). Smaller species *nana* Hahn & Herrich-Schäffer.

16(13). Emargination of the ninth segment of the male deep (fig. 13). Upper branches of the third conjunctiva appendages usually conical and pointed but they may be recurved; lower branches not capitate, divergent in ventral view; the base of each appendage broader (fig. 22). Vesica more swollen, apex shorter and more conical (fig. 31). Basal segment of each antenna may be completely black, femora widely black apically. Species from Madagascar *madagascariensis* (Signoret).

Systematic account of the species of *Calidea* Laporte.

In this account I have dealt only with those species of *Calidea* represented in the British Museum collection.

C. panaethiopica Kirkaldy, 1909.

panaethiopica Kirkaldy, 1909 : 302 (*Calidea*).
signatus Fabricius, 1794 : 81 (*Cimex*).
signata Stål, 1873 : 23 (*Callidea*). Schouteden, 1903 : 34 (*Callidea*).

Fabricius' name *signatus* Fab., 1794, is preoccupied (Fabricius, 1775, *Syst. Ent.* : 818), and Kirkaldy's name *panaethiopica* must be used.

Antennae. First and second segments subequal, and the first shorter than the third. The basal segment is obscurely red. *Thorax.* Usually some tint of blue or green, often coppery. Pronotal spots : those of the anterior row small, and the median three of the posterior row sometimes curved and fused at their anterior and posterior extremities. Lateral margins of the pronotum narrowly concolorous with the venter. Scutellar spots large and transverse ; usually, however, not fused across ; median line narrow, not reaching to beyond the second pair of spots. Femora and coxae red and the femora are darkened apically. Apical infuscation of the hemelytra encroaching slightly upon the basal clear area. *Abdomen.* Venter red with a single row of spots along each side. The spots are elongated upwards so that they touch the margin of the abdomen ; they touch the fore-margin of each segment near the lower end only, and hence do not appear as a broad band along the side. *Male genitalia.* The ninth segment is black or metallic apically, and very widely emarginate (fig. 6). The third conjunctiva appendages are uniramous and broad, diverging in ventral view ; they are not strongly bent ventrally and the crest is indefinite (fig. 14). Vesica apex short and broad (fig. 23).

Length 17–20 mm., *breadth of pronotum* 7·5–9 mm. Largest species in the genus.

This is a very distinct species, easily recognised by its size and abdominal spots.

The following specimens were examined : Gambia, 6 ♂♂, 3 ♀♀. Senegal, 1 ♂, 3 ♀♀. W. Africa, 1 ♀. Unknown locality, 3 ♂♂, 3 ♀♀.

Type locality, Senegal.

C. bohemani (Stål, 1853).

bohemani Stål, 1853 : 210 (*Libyssa*). Stål, 1873 : 24 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea*).
bohemanni Schouteden, 1903 : 36, fig. 9 and pl. iv, fig. 6 (*Callidea*).

Antennae. First segment longer than the second, but shorter than the third. Usually all black but the first segment may be obscurely red. *Thorax.* The colour is variable but is usually green, blue, or yellowish. The pronotal spots often show no fusion, but there may be a horseshoe-shaped darkening around the anterior and lateral margins which includes the anterior row of spots and the laterals of the posterior row. The lateral margins of the pronotum are concolorous with the venter and are rather narrow. Scutellar spots : the median pair is the largest, the spots are transverse and may fuse across ; the anterior spots are the smallest, the posterior ones being intermediate in size. The median stripe is usually reduced to a broad triangle between the basal pair of spots, just reaching to the second pair. Apical and lateral darkenings are present or absent. The punctation is not as close as in the other species. The colour of the femora is very variable ; they may be yellow with the tip black or they may be completely black. The coxae may be black or yellow independently of the femora. The apical infuscation of the hemelytra encroaches largely upon the basal clear area, sometimes almost completely clouding it ; the hind-wings

are also largely clouded. *Abdomen.* The venter is yellow with two rows of spots along each side. The upper spots are small, placed apically on the segments and on the margin of the abdomen. The lower row of spots surrounds the spiracles. There is no fusion in either row. There is a variable amount of black along the ventral mid-line, with which the spots may fuse. *Male genitalia.* The ninth segment is black apically, contracted and deeply emarginate (fig. 7). The third conjunctiva appendages (fig. 15) are uniramous; they diverge basally but their apices curve inwardly so that from a ventral view they appear to describe a circle; the apices are bent ventrally. The crest is large, starts on the dorsal side of the appendage and twists round until it is ventral at the apex. The appendages are rounded and their bases are fused and comparatively narrow. The vesica is bulbous and the apex is short and narrow (fig. 24).

Length 14–17 mm., *breadth of pronotum* 6–8·5 mm. A medium-sized broad species.

This is also a distinct species, recognisable by the double row of spots along the abdomen, by the shape of the ninth segment of the male, and by the colour of the abdomen.

Specimens seen and localities: Abyssinia: 10 ♂♂, 11 ♀♀, Johalea, R. Bako, vii.1905 (*Ph. C. Zaphiro*). Uganda: numerous specimens (*C. C. Gowdey & C. A. Wiggins*), Entebbe as follows: 4 ♂♂, 8 ♀♀, vii.1911; 21 ♂♂, 25 ♀♀, viii.1911; 17 ♂♂, 11 ♀♀, v.1912; 18 ♂♂, 21 ♀♀, vi.1912; 3 ♂♂, 3 ♀♀, viii.1912; 3 ♂♂, 2 ♀♀, ix.1912; 3 ♂♂, 1 ♀, x.1912; 2 ♂♂, xii.1912; 1 ♀, v.1913; 21 ♂♂, 37 ♀♀, no date; 1 ♀, ii.1912; 4 ♂♂, 4 ♀♀, v.1912; 1 ♀, viii.1912; 17 ♂♂, 27 ♀♀, ix.1912. Entebbe, Forest, 5 ♂♂, 8 ♀♀, vii.1911 (*S. A. Neave*). Msozi, 2 ♂♂, 2 ♀♀, ii.1903 (*Delme Radcliffe*). Ruwenzori, 2 ♂♂, 5 ♀♀ (*Scott Elliot*); 1 ♂, 2 ♀♀, i.1906 (*Legge & Wollaston*). Lake Mutanda, 1 ♂, 5 ♀♀, iii.1911 (*C. H. Marshall*). Nakasongola Buruli, 1 ♂, vii.1911 (*C. C. Gowdey*). Mpumu, 1 ♂, 1 ♀, vii.1911 (*S. A. Neave*). Jinja-Busia, Forest, E. Busoga, 1 ♂, vii.1911 (*S. A. Neave*). Mabira Forest, Chagwe, 1 ♂, 2 ♀♀, vii.1911 (*S. A. Neave*); 6 ♂♂, 9 ♀♀ (*C. C. Gowdey*). Mount Kokanjero, 1 ♂, viii.1911 (*S. A. Neave*). Mbale Kumi Road, 1 ♂, 2 ♀♀, viii.1911 (*S. A. Neave*). Buddu, W. Shores of Victoria Nyanza, 2 ♂♂, 2 ♀♀, ix.1911 (*S. A. Neave*). Tero Forest, S.E. Buddu, 5 ♂♂, 6 ♀♀, ix.1911 (*S. A. Neave*). Mpanga Forest, Toro, 1 ♀, xi.1911 (*S. A. Neave*). Mpumu, 1 ♂, 1913 (*M. Robertson*). Kampala, 1 ♂, 2 ♀♀, vii.1917 (*C. C. Gowdey*). Kenya: Hoey's Bridge, 1 ♀ (*C. R. S. Pitman*). Ilala, E. of Mumias, 1 ♂, 1 ♀, vi.1911 (*S. A. Neave*). S. Kavirondo, 3 ♂♂, 1 ♀, v.1911 (*S. A. Neave*). Kikuyu Escarpment, 1 ♂, iii.1911 (*S. A. Neave*). Nairobi, 1 ♀. Tanganyika: Mpwapwa, 1 ♂, 1 ♀, no date. Bukoba, 12 ♂♂, 9 ♀♀, vi.1912 (*C. C. Gowdey*). Nyasaland: Mlanje Plateau, 3 ♂♂, 4 ♀♀, xii.1913 (*S. A. Neave*). Zomba, 1 ♀, ix.1894. Natal: Durban, 1 ♂ (*J. H. Bowkers*); 1 ♂ (*F. Muir*); 1 ♂. Port Natal, 2 ♂♂, 3 ♀♀. Pine Town, 1 ♀.

Type locality, Caffraria.

C. distinguenda Reiche & Fairmaire, 1848.

distinguenda Reiche et Fairmaire, 1848 : 433 (*Callidea*). Stål, 1873 : 24 (*Callidea*). Schouteden, 1903 : 43, pl. i, fig. 7 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea*).

?*natalensis* Stål, 1873 : 24 (*Callidea*). Schouteden, 1903 : 45 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea*).

?*duodecimpunctata* Dallas, 1851 : 21 (*Libyssa*). Stål, 1865 : 44 (*Callidea*) excl. syn.

Stål (1873 : 24) mentioned that *C. natalensis* may possibly be identical with *C. distinguenda*, the only differences that he noted being those of stature. So far as I can determine, all the specimens supposed to belong to these two species in the British Museum are identical in all respects except for colour,

which is variable in all species. I am treating these two species as identical until it is possible to examine the types. It is, of course, quite possible no specimens of the form Stål named *C. natalensis* are in the British Museum.

Antennae. Short and thick, the third segment being subequal to, or slightly shorter than, the first, and one and a half times as thick. The fourth and fifth segments are as thick as the third. The first segment is partially or completely red. *Thorax.* Colour variable as usual, blue, green, purple, or red, often very brilliant. Pronotal spots small, distinct and unfused. The lateral margins of the pronotum may be of the same colour as the venter, but this light area may be reduced or completely absent; it is most often present as a light spot just in front of the hind angles. The scutellar spots are small and unfused and are of approximately equal size. The median line if present reaches to the third pair of spots. The apical and lateral darkenings are present in the darker forms only. In the red varieties the spots are not black but of a slightly different red, and in these forms the under surface of the thorax is darker than the upper. The scutellum is rounded apically (fig. 4). There is no light stripe along the base of the costa of the hemelytron. The femora are completely red, there being no black apex, and sometimes the tibiae are partially or completely red. *Abdomen.* The venter is red, with the usual single row of spots along each side. Each spot may be partially or completely divided into two, so that there appear to be two horizontal rows one above the other, but it is the upper row which encloses the spiracles (cf. *C. bohemani*). There is not, as a rule, any longitudinal fusion of the spots. *Male genitalia.* Ninth segment entirely black or metallic; it is rather small and tends to be pointed. The apex is widely and shallowly emarginate (fig. 8). The third conjunctiva appendages are uniramous, elongate and narrow; seen ventrally they more or less converge but they are variable in that respect (fig. 16). The crest is narrow and twisted as in *C. bohemani* but less markedly; they are curved ventrally but not strongly. The vesica is very characteristic; it is narrow and the apex is long and bent ventrally as shown in figure 25.

Length 8·5–12 mm., *breadth of pronotum* 4–6 mm. A small narrow species with the abdomen apically contracted.

I have thought it best to omit reference to var. *pulchrior* Kirkaldy (*pulchra* Schouteden, 1903 is preoccupied, *see* Hope Catalogue 1837 : 4) until it is possible to examine the type.

C. distinguenda is easily separated from the other species of the genus because of the short third antennal segment and the rounded tip to the scutellum.

Distribution of the specimens seen: Somali: 7 ♂♂, 5 ♀♀, i.1897 (*Miss Gillett*). Abyssinia: 1 ♀. Uganda: Murchison Range, 1 ♀. Belgian Congo: S.E. Katanga, 2 ♂♂, xii.1907 (*S. A. Neave*). Nyasaland: Mlanje, 1 ♂, 2 ♀♀, iii.1913 (*S. A. Neave*); Karonga District, 1 ♂, vii.1910 (*S. A. Neave*). Angola: 2 ♀♀. N. Rhodesia: Serenji District, 8 ♂♂, 8 ♀♀, xii.1907 (*S. A. Neave*). S. Rhodesia: Salisbury, 1 ♂, 2 ♀♀ (*S. Marshall*); Umfali River, Mashonaland, 3 ♂♂ (*G. Marshall*). Transvaal: Rustenburg, 1 ♂; Pretoria, 1 ♂. Natal: 1 ♀, 1902 (*J. F. Queket*). ? locality: 1 ♂.

Type locality, Abyssinia.

C. humeralis (Walker, 1867).

humeralis Walker, 1867 : 17 (*Scutellera*). Kirkaldy, 1909 : 302 [as a var. of *Calidea duodecimpunctata* (Fab.)].
purpurascens Walker, 1868 : 509 (*Libyssa*). Schouteden, 1903 : 40, pl. i, fig. 6 [as a var. of *Callidea duodecimpunctata* (Fabr.) subsp. *dregei* Germar].
westwoodii Vollenhoven, 1868 : 172 (*Libyssa*). Stål, 1873 : 24 (*Callidea*).
westwoodi Lethierry & Severin, 1893 : 30 (*Callidea*).

Antennae. First segment longer than the second and shorter than the third. Basal segment entirely red. *Thorax.* There are two colour forms, one of a reddish-purple (the type) and the other of a deep blue-black. So far as could be determined the distribution of the two forms is much the same. Head and thorax unicolorous except for the lateral pronotal margins which are concolorous with the venter and broader than in any other species. Spots absent or represented by less shining areas only, never very distinct. Femora and coxae entirely red. *Abdomen.* Venter clear red or orange. There is a single row of spots along each side, always fused to form a longitudinal band, the lower side of which is much less jagged than in the other species of the group, but this is a character which must be used with considerable care. *Male genitalia.* Ninth segment red apically. Emargination in the form of a wide and deep V (fig. 11). Third conjunctiva appendages forked; the upper branches are large, strongly recurved, pointed, and bent outwards so that they lie in a horizontal plane and do not point ventrally as do those of *dregii*. The median lobe is large but does not project beyond the apices of the ventral branches (fig. 19). The vesica is not strongly swollen, the apex is elongate, parallel-sided, and with an upturned lip (fig. 28).

Length 12–16 mm., *breadth of pronotum* 6–8 mm. A medium-sized broad species.

Easily separated from the other species of the second group by its coloration, and broad red or yellow pronotal margins.

The types of *Scutellera humeralis* Walker and *Libyssa purpurascens* Walker are in the British Museum. The type of the former had no type-label but two female specimens were found bearing labels "New Hebrides" and "Not from New Hebrides" and correspond to Walker's description; hence one is considered to be the type and the other a paratype. The type and two paratypes of *Libyssa purpurascens* are all females and labelled "E. Africa."

Distribution of the specimens seen: *Typical form*: NYASALAND: Luchenza, Magunda Estate, 1 ♂, 1 ♀ (*F. Nisbet*). Mlanje, 1 ♀, vii.1913 (*S. A. Neave*). Malperera, 1 ♀, 1912 (*H. M. Ross*). Lower Shiré Valley, 1 ♀, iv.1910 (*S. A Neave*). MOZAMBIQUE: Zambesi River, 1 ♂, 1913 (*H. Swale*). Delagoa Bay, 1 ♂, 1 ♀. ? locality, 2 ♂♂, 1901 (*Muir*). TRANSVAAL: Lydenburg, 1 ♀. ? locality, 1 ♂. *Dark blue form*: KENYA: Samburu, 1 ♂, xi.1896 (*C. S. Betton*). Mombasa, 2 ♂♂, 1 ♀, ii.1912 (*S. A. Neave*); 5 ♂♂, 4 ♀♀. Lake Mpeketoni, nr. Kipini, 6 ♂♂, 13 ♀♀, iii.1912 (*S. A. Neave*). Uchweni Forest, 1 ♀, iii.1912 (*S. A. Neave*). ? locality, 2 ♀♀. TANGANYIKA: Lindi, 1 ♂, 1925 (*W. E. Cutler*). NYASALAND: Dedza District, 1 ♀, vii.1913 (*J. B. Davey*). MOZAMBIQUE: Port Amelia, 2 ♂♂, 2 ♀♀ (*F. V. Beste*). ? locality, 1 ♂.

C. dregii Germar, 1837.

dregii Germar, 1837 : 191 (*Callidea*). Stål, 1873 : 23 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea duodecimpunctata* (Fabr.) subsp.).
examinans White, 1842 : 85 (*Callidea*).
signoreti Stål, 1853 : 210 (*Libyssa*).
dregei Schouteden, 1903 : 38 (*Callidea duodecimpunctata* (Fabr.) subsp.).

Antennae. First segment partially or completely red, longer than the second and shorter than the third. *Thorax.* Colour very variable, metallic blues, greens, reds, common, often dark. Pronotal spots variable, usually fused to form three longitudinal stripes, the lateral stripes including both outer spots of each side of the posterior row. The light lateral margin of the pronotum is often narrow but broadens at its anterior extremity. The scutellar spots are typically unfused, though those of the median pair are transverse and may tend towards fusion. The central stripe typically reaches almost to the third pair of spots. Lateral and apical darkenings present to a greater or lesser extent. The general background is often so dark that the spots are not obvious at the first glance.

Typically the femora are completely red. *Abdomen.* Venter red, with a single row of spots along each side which are usually, but not always, fused to form a longitudinal jagged line. The spots are often extended downwards along the apices of the segments so that the spots of the two sides approach each other, and are separated by about the length of one spot; the last visible unmodified sternite may be completely black by the fusion of the spots across it. This is more obvious in darker specimens. *Male genitalia.* Ninth segment red apically and there is a U-shaped emargination (fig. 9), the limits of which are rectangular. The third conjunctiva appendages are forked; the upper branches are smaller than the lower, thorn-like, being much broader at the base than apically, pointed and recurved; the lower branches are wide apart basally and not strongly divergent or convergent, but they project ventrally; the median lobe is rather small (fig. 17). Vesica not strongly swollen, apex moderately elongate, and triangular (fig. 26).

Length 10–15 mm., *breadth of pronotum* 4·5–7 mm. A small to medium-sized species with a rather narrow scutellum.

Distribution of the specimens examined: BRITISH SOMALILAND: 1 ♀, 1908 (*Drake-Brockman*). KENYA: Mombasa, 1 ♀, 1914 (*S. A. Neave*). BELGIAN CONGO: Stanley Pool, 10 ♂♂, 15 ♀♀, 1911; Lualaba River, 2 ♂♂, 2 ♀♀, iv.1907 (*S. A. Neave*). TANGANYIKA: 1 ♀ (*Carson*). NYASALAND: Karonga District, 1 ♀, vii.1910 (*S. A. Neave*); Luchenza, Magunda Estate, 18 ♂♂, 10 ♀♀ (*F. Nisbet*); Mlanje, 1 ♀, 1914 (*S. A. Neave*); S.W. shore of L. Nyasa, 1 ♀, iii.1910 (*S. A. Neave*); Dedza District, 1 ♂, 1 ♀, vii.1913 (*J. B. Davey*); Malperera, 2 ♂♂ (*H. M. Ross*); S.W. Nyasa, 1 ♀ (*R. Webb*); Fort Johnston, 2 ♂♂, 2 ♀♀ (*P. Rendal*); ? locality, 4 ♂♂, 5 ♀♀. N.E. RHODESIA: Upper Luangwa River, 2 ♀♀, viii.1910 (*S. A. Neave*). ANGOLA: 1 ♀. MOZAMBIQUE: Zambesi River, 1 ♀ (*H. Swale*); Beira, 12 ♂♂, 16 ♀♀, 1907 (*C. D. Rudd*); Delagoa, 1 ♂. SOUTH-WEST AFRICA: Damara, 1 ♂. BECHUANALAND: Ghanzi, 1 ♂, i.1925 (*J. Maurice*). TRANSVAAL: (North) 1 ♀ (*C. A. Fry*); Pretoria, 1 ♂, 2 ♀♀; ? locality, 1 ♀. "SOUTH AFRICA": 5 ♂♂, 4 ♀♀. "AFRICA": 1 ♂, 2 ♀♀ (Kirkaldy Coll. 1912).

Type locality, Cape of Good Hope.

C. dregii var. *apicalis* Schouteden, 1903.

apicalis Schouteden, 1903 : 41 (*Callidea duodecimpunctata* subsp.). Kirkaldy, 1909 : 302 (also as subsp.). Schouteden, 1912 : 298, fig. 1, pl. xv, fig. 1 (*Calidea*).

This is apparently a well-marked variety of *C. dregii*; the male genitalia, however, are the same as those of *C. dregii* and I regard it as a variety and not as Schouteden does (1912 : 298) a separate species.

This variety may be separated from *C. dregii* by the following characters:

The scutellar spots are very large and transverse and usually all three pairs fuse across and may touch, so that most of the scutellum is black with only narrow longitudinal lines of the ground colour showing. The femora are apically black, sometimes half but never less than a quarter of the length being black. The abdominal spots are always expanded along the apex of the segments (see above for *C. dregii*), and the venter is often clouded with black.

Distribution of the specimens seen: KENYA: 1 ♂, 2 ♀♀. TANGANYIKA: Kongwa, 4 ♂♂, 2 ♀♀, iii.1917 (*A. Loveridge*); Usumburu, L. Tanganyika, 7 ♂♂, 3 ♀♀, v.1927 (*R. Bois*); Mpwapwa, 4 ♂♂, 3 ♀♀ (*Baxter*); Ndala Mission, 3 ♂♂, 1 ♀, i.1917 (*G. D. H. Carpenter*); Stigi, 1 ♂, x.1917 (*G. D. H. Carpenter*); Zanzibar, 1 ♀. NYASALAND: 1 ♂, 1 ♀. GRIQUALAND WEST: 1 ♂.

Type locality, East Africa.

C. hutereauae Schouteden, 1917.

hutereauae Schouteden, 1917 : 281 (*Calidea*).

Antennae. Completely black. First segment longer than the second and shorter than the third. *Thorax.* Colour of the thorax dark blue-green, spots of a darker blue to black. The median spots of the prothorax are usually fused to form a median stripe, and the other spots are all unfused. Median scutellar spots oblong, and the central stripe reaches to the third pair of spots; the apical and lateral darkenings are not well defined. The lateral pronotal margins are usually not concolorous with the venter, but if they are the margin is very narrow and not obvious. There is no light stripe along the base of the costae of the hemelytra. The hemelytra are completely clouded, there being no basal clear area. Femora red on the basal half; coxae red. This colouring is, however, variable and the femora and coxae may be almost completely black or blue-green. *Abdomen.* The venter is dusky-red. The spots are large and metallic blue-black. They are fused to form a broad band, and may encroach considerably upon the ground colour. *Male genitalia.* Ninth segment red apically; the apex is not sharply truncate as in *C. dregii* but broadly and shallowly emarginate in the middle, with a deep U-shaped emargination, its limits rounded (fig. 10). Third conjunctiva appendages very similar to those of *C. dregii* in side view, but the upper branch is much narrower basally and hence appears to be longer and not at all thorn-like. In ventral aspect the lower branches diverge strongly from each other (fig. 18). The vesica is more swollen than is that of *C. dregii* and the apex is shorter (fig. 27).

Length 11–13 mm., *breadth of pronotum* 5·5–6·5 mm.

A rather small, short, species which can be recognised quite easily by its squat appearance and by its colour and lack of stripe along the costae of the hemelytra.

Distribution of the specimens seen (all collected by *S. A. Neave*) : Uganda : E. Mbale District (Forest), 4 ♂♂, 6 ♀♀, viii.1911; Mpanga Forest, Toro, 1 ♀, xi.1911. Kenya : Yala River, Kakumga Forest, 1 ♂, 4 ♀♀, v.1911; Kisii District, S. Kavirondo, 1 ♂, v.1911.

Type locality, Congo.

C. duodecimpunctata (Fabricius, 1798).

duodecimpunctatus Fabricius, 1798 : 527 (*Cimex*).
duodecimpunctata Stål, 1873 : 4 (*Callidea*). Schouteden, 1903 : 37 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea*).

In 1836 Hahn and Herrich-Schäffer (1836, 3 : 100, fig. 325) described a small species, *Callidea nana* which has until now been regarded as synonymous with *C. duodecimpunctata* (Fabr.). By examining the male genitalia of *C. duodecimpunctata* (Fabr.), however, I have found it possible to separate the two species, one small and one large. As I have been unable to see the types, I do not know which is Fabricius' species, or whether *C. nana* is really the same, but it is just possible that the smaller one is *C. nana* Hahn & Herrich-Schäffer, whilst the larger one is the true *C. duodecimpunctata* (Fabr.). Hence rather than use new names before examining the types, I have provisionally separated the species, and used the two names in this manner.

The two species are obviously closely allied, as they only differ constantly in the shape of the third conjunctiva appendages and the vesica, and it may be possible later to prove that they are only races of one species. However, for the present I prefer to regard them as separate species.

In the synonymy given here, I regard all the names, except of course

C. nana, as referring to *C. duodecimpunctata*, though an examination of specimens would, no doubt, show this to be wrong.

Antennae. Size of the three basal segments variable, the first and second tend to be subequal, whilst the third is usually rather shorter than the first two together; however, this character cannot be relied upon. The colour of the basal segment is also variable, it may be completely black or completely red, and all degrees of intermediacy can be found. *Thorax.* Colour variable, yellow, red, coppery, blue, purple, and green are all common colours, though as a rule each race is more or less constant in colour. Pronotal spots: the median spots of the two rows are fused to form a median line; the outermost laterals of the posterior row are fused to the laterals of the anterior row; the inner laterals of the posterior row are usually unfused, but may fuse with the laterals of the anterior row; the median line formed by the fusion of the central spots of the two rows shows no tendency to split into its constituent spots. Scutellar spots: the spots of the median pair are slightly larger than those of the other two pairs, and they are often more transverse and fused to the median line; the median line is broad and reaches to the third pair of spots, and it is well marked, and in the specimens examined showed no tendency to disappear; apical and lateral darkenings present. The lateral pronotal margins are concolorous with the venter and variable in width. The apical infuscation of the hemelytra is complete, but, though somewhat lighter posteriorly, it is not clear as in *C. nana*. This is a dubious character but as the two species are difficult to separate I have included it for what it is worth. Femora and coxae red, though infuscated in dark specimens so as to appear black. *Abdomen.* Venter red with the usual single row of spots, which are generally distinct and not fused to form a longitudinal band. *Male genitalia.* Ninth segment red apically, and the emargination is in the form of a shallow V (fig. 12). The third conjunctiva appendages are forked; the upper branch is not strongly recurved or pointed, and is broad, though not as broad as is that of *C. nana*; the lower branch is scarcely capitate, converging with its fellow but not as strongly as in *C. nana*, smaller than in that species; the median lobe is much reduced (fig. 20). Vesica small, apex long and parallel-sided (fig. 29), longer than is that of *C. nana*.

Length 11–13 mm., *breadth of pronotum* 6–6·5 mm. A small to medium-sized broad species.

Distribution of the specimens examined: Arabia: 1 ♂, 2 ♀♀ (*Percival & Dodson*). Sudan: Port Sudan, 1 ♂, 1 ♀, 1915 (*N. E. Waterfield*). Aden: 8 ♂♂, 14 ♀♀, iii.1895. British Somaliland: 1 ♀, 1908 (*Drake-Brockman*); Taleh, 3 ♂♂, 3 ♀♀, xii.1930 (*T. H. Twigg*). Abyssinia: 1 ♀; Scioa, L. Cialalaka, 2 ♂♂. Kenya: Naivasha, 1 ♀, ii.1901 (*C. B. Beston*); Mkunumbu, 3 ♂♂, ii.1912 (*S. A. Neave*); Mombasa, 2 ♂♂, ii.1912 (*S. A. Neave*); L. Mpeketoni, nr. Kipini, 2 ♂♂, 5 ♀♀, iii.1912 (*S. A. Neave*); "East Africa," 2 ♂♂, 1 ♀. Tanganyika: Usambara, 1 ♀; Dar-es-Salaam, 3 ♂♂, 5 ♀♀, iii.1898. Belgian Congo: Lualaba River, 1 ♀, iii.1907 (*S. A. Neave*). N.E. Rhodesia: Upper Luangwa River, 1 ♂, viii.1910 (*S. A. Neave*). Mozambique: Delagoa Bay, 1 ♀; Bazi River, 1 ♀, v.1915. Bechuanaland: Ngami Country, 2 ♀♀ (*F. D. Ludgard*). Transvaal: 1 ♀. ? locality, 2 ♀♀.

Type locality, Cayenne.

C. nana Hahn & Herrich-Schäffer, 1836.

nana Hahn & Herrich-Schäffer, 1836: 100, fig. 325.

See also *C. duodecimpunctata* above.

The following is a list of characters in which *C. nana* differs from *C. duodecimpunctata*:

Antennae. Basal segment red in all the specimens examined. The lengths of the three basal segments variable, but the first is longer than the second, and often approximately equal to the third. *Thorax*. Coloration of the thorax and the arrangement of the spots is very similar to that of *C. duodecimpunctata*, but the median line of the prothorax tends to split into its constituent spots, and the median line of the scutellum tends to disappear especially in the lighter coloured specimens. Femora and coxae red, no black on the femora of any of the specimens examined. The apical infuscation of the hemelytra is not complete posteriorly, there being a light unclouded area; sometimes this area is represented by a clear longitudinal patch in the centre of the infuscation. This is quite obviously a character open to considerable variation and should be used with care. *Male genitalia*. Ninth segment similar to that of *C. duodecimpunctata*. The upper branches of the third conjunctiva appendages are large, broad, and slightly recurved; actually the breadth is somewhat variable but it is always greater than in *C. duodecimpunctata*; the lower branches are very strongly capitate, and in ventral view are seen practically to touch; the median lobe is reduced (fig. 21). Vesica similar to that of *C. duodecimpunctata*, only the apex is shorter (fig. 30).

Length 8·5–11·5 mm., *breadth of pronotum* 4–4·5 mm. A small broad species.

Distribution of the specimens seen: SENEGAL: 1 ♀. GOLD COAST: Tamale, 1 ♀, 1913 (*C. E. S. Watson*); and 1 ♀, xii.1916 (*J. J. Simpson*); Yapi, 2 ♂♂, 5 ♀♀, xii.1916 (*J. J. Simpson*); Zan, 1 ♂, i.1917 (*J. J. Simpson*): Zuo, 1 ♂, 1 ♀, i.1917 (*J. J. Simpson*). N. NIGERIA: Minna, 2 ♀♀, x.1910 (*J. J. Simpson*); Kogin Sirikin Pawa, 1 ♂, xi.1910 (*Scott-Macfie*). NUBIA or UPPER EGYPT: 1 ♂, 2 ♀♀. ABYSSINIA: Scioa, L. Cialalaka, 2 ♂♂. UGANDA: Between Kumi and L. Kioga, 1 ♂, viii.1911 (*S. A. Neave*). ? locality, 3 ♂♂, 1 ♀.

Hahn and Herrich-Schäffer describe *C. nana* from China, probably in error.

C. madagascariensis (Signoret, 1861).

madagascariensis Signoret, 1861 : 917 (*Libyssa*). Stål, 1873 : 23 (*Callidea*). Schouteden, 1903 : 46 (*Callidea*). Kirkaldy, 1909 : 302 (*Calidea*).

The specimens of this species in the British Museum were collected on at least two expeditions, and are divisible into two markedly different groups. The specimens of the first group are all small and were taken by Scott Elliot in the south of Madagascar; those of the second group are all medium-sized and were collected partially by the Reverend R. Joy in the forests in the neighbourhood of Antananarivo (the centre of the island), whilst of the rest one has North Madagascar on the label, and the others simply Madagascar, but as they are all very similar in form it is highly probable that they all came from the northern half of the island.

The male genitalia of the two groups are similar, though there is a tendency in the second group for variation in the shape of the upper branches of the third conjunctiva appendages. Probably by examining more material it would be possible to obtain a complete gradation between the two groups from the north to the south.

Below, I have first described the male genitalia, and then followed it by descriptions of the other characters of each group separately.

Male genitalia. Ninth segment red apically, emargination deep V-shaped (fig. 13). Third conjunctiva appendages forked; upper branch not strongly recurved and not sharply pointed; usually it projects dorsally and is recurved at the tip (fig. 22); lower branches short and conical and diverging in ventral view; the portion of each appendage before it forks is much broader than in any other species; the median lobe is moderate in size.

Vesica swollen, and with a conical apex, which sometimes tends to be parallel-sided (fig. 31). In the second group from N. Madagascar the upper branches of the third conjunctiva appendages may be rather more curved and twisted, but I do not consider this marked enough to be a specific difference.

Group I (from S. Madagascar).

Antennae. Basal segment longer than the second and shorter than the third. Basal segment black at least apically, often nearly completely black. *Thorax.* Background usually rather light, tending sometimes towards straw-colour. Spots and darkenings of a mauvish tint, which combined with the small size are characteristic of this group. Pronotal spots: median spots of the two rows fused to form a median line; outer laterals of the posterior row are fused to the laterals of the anterior row to form a lateral line to which the inner laterals of the posterior row are sometimes fused. The pronotal margin is concolorous with the venter, but this is not obvious owing to the general light background; the margin is of medium width. Scutellar spots: all three pairs are of approximately equal size, and are not fused to the median line, which is broad and reaches to the third pair of spots. Apical and lateral darkenings present. The femora are black apically at least, and are sometimes as much as two-thirds black. *Abdomen.* Venter reddish to straw-coloured, the usual row of spots is present, they are often separate but may be more or less fused.

Length 10–12 mm., *breadth of pronotum* 4–5·5 mm.

5 ♂♂ and 6 ♀♀ were examined.

Group II (from N. Madagascar).

Antennae. Basal segment longer than the second and shorter than the third. Basal segment entirely black. *Thorax.* Ground colour red though sometimes tinged with coppery, and the spots are black or mauve. The arrangement of the spots is the same as in the first group except that the middle pair of scutellar spots are the largest, are transverse, and are often fused to the median line. The lateral margins of the pronotum are concolorous with the venter, but this is not very obvious as both the thorax and the venter are red of slightly different shades. The arrangement of red and black on the femora is very characteristic, the black apex being progressively smaller from anterior to posterior. The anterior femora are two-thirds black, the middle ones half black and the hind ones one-third black. *Venter* of a deeper red than the upper surface, spots large and more or less fused.

Length 13–15 mm., *breadth of pronotum* 6–7 mm.

4 ♂♂ and 6 ♀♀ were examined.

C. haglundi Schouteden, 1903.

haglundi Schouteden, 1903 : 42 (*Callidea*).

I have been unable to examine any specimens of this species, which Schouteden described from one specimen.

C. wembärensis Lehmann, 1919.

wembärensis Lehmann, 1919 : 187 (*Callidea*).

I have been unable to examine any specimens of this species which was found on the Wembäre Steppe (Tanganyika).

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